

09/879,335

REMARKS

Claims 1-50 and 58-71 are pending in the application with claims 1, 16, 36, and 43 amended herein and new claims 66-71 added herein.

Claims 1-8, 13-19, 21, and 58-60 stand rejected under 35 U.S.C. 102(e) as being anticipated by Gonzalez. Applicant requests reconsideration. Claim 3 is not listed on page 2 or anywhere else in the Office Action as rejected. However, page 3 references claim 3 as disclosed so Applicant assumes it was intended for rejection.

Amended claim 1 sets forth a capacitor forming method that includes, among other features, forming an insulation layer over a substrate, forming an insulative barrier layer to threshold voltage shift inducing material, forming an opening at least into the insulation layer, forming a high K capacitor dielectric layer, and providing threshold voltage shift inducing material over the barrier layer. Page 2 of the Office Action alleges that Gonzalez discloses every limitation of claim 1. However, Applicant asserts that Gonzalez does not disclose or suggest an insulative barrier layer.

Gonzalez describes in column 6, lines 10-17 that conductive layer 41 may include a transition metal nitride. Notably, layer 41 is specifically referred to as conductive layer 41 since the transition metal nitrides listed are conductive materials. Reference to Fig. 6 of Gonzalez and the accompanying text in column 6, lines 33-59 reveal that conductive layer 41 provides an electrically conductive connection between storage node 44 and storage node junction 43. Amended claim 1 sets forth that the barrier layer is insulative. Amended claim 1 is supported at least by page 10 of the present specification. No suggestion exists within Gonzalez that conductive layer 41 can instead be insulative. Accordingly, Gonzalez does not anticipate claim 1.

09/27/03

Claims 2-8, 13-15, 58, and 59 depend from claim 1 and are not anticipated at least for such reason as well as for the additional limitations of such claims not disclosed. For example, claim 3 sets forth that the barrier layer contains a silicon nitride. Page 3 of the Office Action alleges that Gonzalez discloses a barrier containing nitride. However, the text of Gonzalez relied upon by the Office merely describes transition metal nitride. As indicated above, transition metal nitride is conductive. In contrast, silicon nitride is insulative. Also, silicon is not a metal. At least for such reasons, no person of ordinary skill would view Gonzalez as disclosing an insulative barrier layer that contains a silicon nitride.

Also, for example, claim 4 sets forth that the barrier layer consists essentially of a globally planar barrier layer. Page 3 of the Office Action alleges that conductive layer 41 of Gonzalez is planarized. However, those of ordinary skill readily recognize that a "planarized" layer does not necessarily dictate that such layer is "globally planar," as claimed. The term "globally planar" barrier layer is discussed in the present specification at the bottom of page 9 extending to the top of page 10. As known to those of ordinary skill and defined in the present specification, a globally planar barrier layer exists essentially in one plane over a particular substrate, semiconductor die or bulk semiconductor wafer. As shown in Figs. 5 and 9 and discussed on page 14 of the present specification, it can be advantageous to form a barrier layer as a globally planar layer. When claim 4 is properly interpreted in light of the present specification, it is apparent that conductive layer 41 in Gonzalez cannot be considered to disclose a globally planar barrier layer. Conductive layer 41 is not in one plane.

Amended claim 16 sets forth a capacitor forming method that includes, among other features, forming an insulative barrier layer to threshold voltage inducing material

09/879,335

over an insulation layer, forming an opening through the barrier layer and into the insulation layer, forming a high K capacitor dielectric layer, and providing threshold voltage shift inducing material over the barrier layer. As may be appreciated from the discussion above regarding the deficiencies of Gonzalez as applied to claim 1, Gonzalez does not disclose the claim 16 insulative barrier layer. At least for such reason, Gonzalez does not anticipate claim 16.

Claims 17-19, 21, and 60 depend from claim 16 and are not anticipated at least for such reason as well as for the additional limitations of such claims not disclosed. For example, claim 16 sets forth that the barrier layer contains Si_3N_4 . Also for example, claim 18 sets forth that the barrier layer consists essentially of a globally planar barrier layer. As may be appreciated from the discussion above regarding the deficiencies of Gonzalez as applied to claims 3 and 4, claims 17 and 18 are also not anticipated.

At least for the reasons set forth herein, claims 1-8, 13-19, 21, and 58-60 are not anticipated by Gonzalez. Applicant requests allowance of such claims in the next Office Action.

Claims 22-35 and 61-64 stand rejected under 35 USC 102(e) as being anticipated by Parekh. Applicants request reconsideration. Applicant notes that the present application depends for priority from Parekh. Accordingly, Parekh is not prior art as to the present application. Applicant requests allowance of claims 22-35 and 61-64 in the next Office Action.

Claims 36-50 and 65 stand rejected under 35 USC 102(e) as being anticipated by Thakur. Applicant requests reconsideration.

Amended claim 36 sets forth a capacitor forming method that includes, among other features, forming an opening into an insulation layer, forming a capacitor

09/879,335

electrode at least within the opening, forming a barrier layer to threshold voltage shift inducing material at least over all of the insulation layer, forming a high K capacitor dielectric layer at least over the capacitor electrode, and providing threshold voltage shift inducing material over the barrier layer. At least Figs. 14-19 of the present specification support the subject matter of amended claim 36. Page 5 of the Office Action alleges that Thakur discloses every limitation of claim 36. However, Applicant asserts that Thakur does not disclose forming a barrier layer at least over all of the insulation layer.

Fig. 1A of Thakur and the accompanying text describes the only structure alleged by the Office to disclose the subject matter of claim 36. Reference to Fig. 1A reveals that diffusion barrier 122 is formed as an integral part of capacitor memory cell structure 100. Since memory cell 100 is formed over a limited portion of insulation material 116, it follows that diffusion barrier 122 can only be formed over a similarly limited portion of insulation material 116. Accordingly, diffusion barrier 122 does not disclose the claimed barrier layer formed at least over all of an insulation layer. It follows that Thakur does not anticipate claim 36.

Claims 37-42 depend from claim 36 and are not anticipated at least for such reasons as well as for the additional limitations of such claims not disclosed. For example, claim 40 sets forth that the barrier layer consists essentially of a globally planar barrier layer. Properly interpreting claim 40 in light of the present specification necessarily reaches a conclusion that Thakur does not disclose the subject matter of claim 40. Page 5 of the Office Action alleges that Thakur discloses the subject matter of claim 40 by describing "simple planar capacitors." However, Applicant notes that claim 40 includes all of the limitations set forth in independent claim 36 from which it

09/879,335

depends. Accordingly, claim 40 includes forming a capacitor electrode at least within an opening into an insulation layer. Applicant asserts that the planar capacitors of Thakur do not disclose such subject matter of claim 40.

Amended claim 43 sets forth a capacitor forming method that includes, among other features, forming an opening into an insulation layer, forming a capacitor electrode at least within the opening, forming a high K capacitor dielectric layer, forming a barrier layer threshold voltage shift inducing material at least over all of the insulation layer and providing threshold voltage shift inducing material over the barrier layer. As may be appreciated from the discussion above regarding the deficiencies of Thakur as applied to claim 36, Thakur does not anticipate claim 43. Claims 44-50 and 65 depend from claim 43 and are not anticipated at least for such reason as well as for the additional limitations of such claims not disclosed. For example, claim 48 sets forth that the barrier layer consists essentially of a globally planar barrier layer.

At least for the reasons set forth herein, Thakur does not anticipate claims 36-50 and 65. Applicant requests allowance of such claims in the next Office Action.

Claims 9-12 and 20 stand rejected under 35 USC 103(a) as being unpatentable over Gonzalez in view of Tsunemine. Applicant requests reconsideration. Claims 9-12 depend from claim 1 and claim 20 depends from claim 16. The subject matter of claims 1 and 16 is discussed above. The Office Action relies upon Tsunemine as allegedly disclosing the subject matter of claims 9-12 and 20 that is absent from Gonzalez. However, Tsunemine does not remedy and is not allege to remedy the deficiencies of Gonzalez discussed above as applied to amended claims 1 and 16. Since both references are deficient in the same respect, combination of Gonzalez and Tsunemine can not be considered to disclose or suggest the subject matter of claims 9-12

09/879.335

depending from claim 1 and claim 20 depending from claim 16. At least for such reason, claims 9-12 and 20 are patentable and Applicant requests allowance of such claims in the next Office Action.


Claims 37, 38, 45, and 46 stand rejected under 35 USC 103(a) as being unpatentable over Thakur. Applicant requests reconsideration. Applicant notes that Thakur qualifies as prior art only under one or more of subsections (e), (f), and (g) of 35 U.S.C. 102. The subject matter of Thakur and of claims 37, 38, 45, and 46 were, at the time the invention was made, owned by Micron Technology, Inc. or subject to an obligation of assignment to Micron Technology, Inc. as evidenced by recorded assignments pertaining to the present application and to Thakur. According to 35 U.S.C. 103(c), Thakur cannot preclude patentability under section 103. Thus, Applicant requests withdrawal of the rejection and allowance of claims 37, 38, 45, and 46 in the next Office Action.

New claims 66-71 are added herein. Claims 66, 68, 70, and 71 set forth the subject matter of original claims 4, 18, 40, and 48 and are rewritten in independent form. Claims 67 and 69 set forth the subject matter of original claims 1 and 16 with added limitations regarding barrier layer position. The subject matter of new claims 67 and 69 is supported at least by Figs. 1-19 of the present specification.

Applicant herein establishes adequate reasons supporting patentability of claims 1-50 and 58-71 and requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

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